

AR-009-144



**PILLAR REPORT -
ENVIRONMENTAL
QUESTIONNAIRE FOR
ARMAMENT STORES**

**REPORT No: ASP1001.96
(AOC 265.96)**

24 July 1996

APPROVED FOR PUBLIC RELEASE

© Commonwealth of Australia

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

A Pillar Report is a formal statement by the Australian Ordnance Council of its policy or philosophy on a subject. It is published for the guidance of Australian Ordnance Council staff and the information of organisations of individuals who may deal with the Australian Ordnance Council. It is not an order, or a management instruction, and it imposes no constraints on designers of manufacturers.



**HEADQUARTERS AUSTRALIAN DEFENCE FORCE
AUSTRALIAN ORDNANCE
COUNCIL**

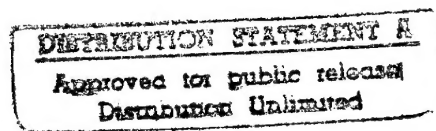
19961009 140



PILLAR REPORT - ENVIRONMENTAL QUESTIONNAIRE FOR ARMAMENT STORES

REPORT No: ASP1001.96
(AOC 265.96)

24 July 1996



DTIC QUALITY INSPECTED

A Pillar Report is a formal statement by the Australian Ordnance Council of its policy or philosophy on a subject. It is published for the guidance of Australian Ordnance Council staff and the information of organisations of individuals who may deal with the Australian Ordnance Council. It is not an order, or a management instruction, and it imposes no constraints on designers of manufacturers.



HEADQUARTERS AUSTRALIAN DEFENCE FORCE
AUSTRALIAN ORDNANCE
COUNCIL

THE UNITED STATES NATIONAL
TECHNICAL INFORMATION SERVICE
IS AUTHORISED TO
REPRODUCE AND SELL THIS REPORT

The information given in this document is not to be communicated either directly or indirectly to the Press or to any person not authorised to receive it.

This work is copyright. Apart from any fair dealing for the purpose of study, research, criticism or review, as permitted under the Copyright Act, no part may be reproduced by any process without written permission. Copyright is the responsibility of the Director Publishing and Marketing, AGPS. Inquiries should be directed to the Manager, AGPS Press, Australian Government Publishing Service, GPO Box 84, Canberra, ACT 2601.

(Note. All correspondence relating to the content of this report should be addressed to:
The Secretary, Australian Ordnance Council,
CP2-3-21, Campbell Park, Canberra, ACT 2600, Australia.)

This report was endorsed at a meeting of the Australian Ordnance Council on 24 July 1996.

PRESIDENT

GROUP CAPTAIN W.M^CD. MAYNE, ARMIT, MIEAust, CPEng

MEMBERS

CAPTAIN S.A. LOCKE, BSc, MIEE, RN

CAPTAIN P.G. PHILLIPS, BTech, Grad Dip Bus Admin, FIQA, RAN

MR R. PARKER, BSc, MSc

SECRETARY

MR W.K. RUSH, ARMIT, MIEAust, CPEng

ATTENDING

Technical Staff

SQUADRON LEADER G. WILCOCK, BE(Hons), Msc

MAJOR D. MORGAN, BSc(Hons)

LIEUTENANT COMMANDER J.J. WILLIAMS, Dip EOT

MR I. KUMMEROW, BSc(Hons), ME, MRACI, MIEAust, CChem, CPEng, AIMM

-iv-

(INTENTIONALLY BLANK)

SUMMARY

1. This report publishes a revised AOC Environmental Questionnaire.
2. AOC Proceeding 194.91 is cancelled.

-vi-

(INTENTIONALLY BLANK)

File: AOC 95-11853
Task No: 270
Tasking Authority: PAOC
AOC Report Number: ASP1001.96 (265.96)

ENVIRONMENTAL QUESTIONNAIRE FOR ARMAMENT STORES

Previous Reports: AOC Proceeding 194.91

INTRODUCTION

1. The AOC provides assessments to the three Services and industry on the safety and suitability for service of weapon systems and explosives. These assessments are based on the results of appropriate trials which include tests to simulate the predicted service environment that the armament store must withstand, from manufacture to target or disposal. This predicted service environment generates a Life Cycle Environmental Profile (LCEP), which in turn is used to generate an Environmental Test Plan (ETP). The store must withstand this simulated service environment without unacceptable degradation, in either safety or performance.

2. The AOC published an Environmental Questionnaire (EQ) as AOC Proceeding 194.91, copies of which were completed by the store's Service managers to obtain the LCEP. Experience has shown that improvements could be made to the EQ in the areas of format and explanation of terms. The Explosives Environmental and Service Life Advisory Committee (EESLAC) was tasked to draft a revised EQ which incorporated improvements in these areas.

AIM

3. The aim of this Report is to publish a revised AOC Environmental Questionnaire.

DISCUSSION

4. The accurate definition of the likely service environment to which a store or weapon system might be exposed during its manufacture to target or disposal sequence is critical in formulating an ETP. If an environment less severe than that which the store might experience is stipulated, latent defects and failure modes may go undetected. Alternatively, if a more severe environment is defined, then a store or system may be unnecessarily modified or rejected. The rationale behind the use of the EQ is discussed in depth at Reference A.

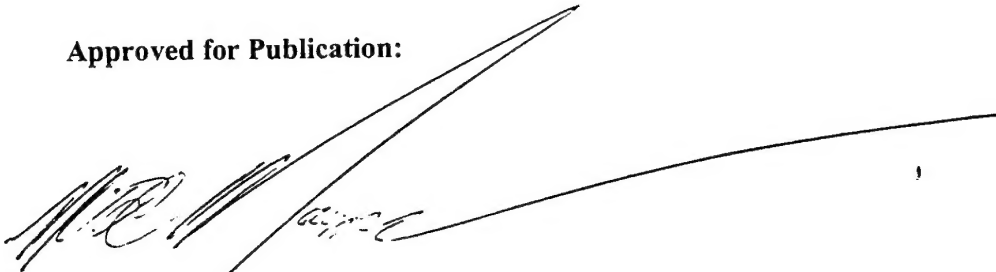
5. The AOC should be involved early in the procurement cycle to advise on definition of the environment, particularly when overseas organisations are contenders for the supply of an item. Ideally this should take place well before competitive tendering action so that the necessary ETP may be included in the Invitation to Tender. Some or all of the information needed to demonstrate the safety and suitability of the store for the specified Australian environment may then be provided by potential suppliers, possibly leading to an overall reduction in project costs.

6. The questionnaire should be completed and certified by project staff, with assistance from the AOC task Technical Staff Officer, as soon as possible after task placement. The revised EQ is at Enclosure 1. If required, the questionnaire can be provided on disk.

CONCLUSION

7. The Environmental Questionnaire for armament stores to be used by project staff and the AOC is published. AOC Proceeding 194.91 is cancelled.

Approved for Publication:



W.M.D.MAYNE
Group Captain
President, Australian Ordnance Council

Reference:

- A. Pisani, J., 'Guidance for Preparation of a Life Cycle Environmental Profile and Environmental Test Plan for Qualification of Explosive Ordnance', DSTO-GD-0032 of June 1995

Enclosure:

1. AOC Environmental Questionnaire

Distribution:

VCDF (Data Sheet Only)
ACDEV
ACMAT-N
ACMAT-A
ACMAT-AF
Engineer in Charge, Environmental Test Facility, ATEA
EOLMSQN (CO)
DWGP-A
DARMENG-N
ATEA (Laboratories and Services Division)
Manager Document Exchange Centre (8 Copies)
Defence Central Library (Technical Reports Centre)
Librarian DSTO Salisbury
Librarian AMRL Melbourne
AMRL (Salisbury, Attn: Mr P.MacDowell)
HQLOGCMD-A (SATO Surveillance)
HQLOGCMD-A (SO2 Ammo)
Manager Armament Surveillance (RAN)
Secretary UK Ordnance Board
Counsellor Defence Science, Australian Defence Staff, Washington
Chairman US DDESB
Chairman USN WSESRB
Director Ammunition Engineering Services (CF)
Head New Zealand Defence Liaison
Technical Project Officer MWDDEA A-79-AS-1254
Technical Project Officer MWDDEA AF-78-AS-7005
NIMIC
ADI Ltd (General Manager, Ammunition Product Development Centre)



AUSTRALIAN ORDNANCE COUNCIL ENVIRONMENTAL QUESTIONNAIRE

STORE NOMENCLATURE.....

AOC TASK NO.....

CERTIFICATION BY SERVICE AUTHORITIES

The information in this questionnaire represents the expected service environment and is consistent with the approved storage and operational requirements and design specifications for this store.

Signature.....

Name.....

Rank.....

Appointment.....

Date.....

Design Approval Authority or
Project Manager / Director

This questionnaire is designed to establish the Life Cycle Environmental Profile (LCEP) that a weapon system or item of explosive ordnance is expected to experience during its life from manufacture to target or disposal. This profile is used by the AOC to determine the necessary trials to simulate those environments. The purpose of this testing is to assess the probable response of the store and its container to natural and induced environmental conditions representative of those likely to be experienced in service. This questionnaire should be completed with the assistance of AOC staff.

Background Information

- 1.1 Store nomenclature or description:
(To include build standard or modification state, where known)
- 1.2 What is the UN Classification of the store and/or its components, if known?
- 1.3 Is a UN Classification required? Y / N
Complete an application for UN classification (TGI 39). Note that additional testing may be required to confirm the classification code.
- 1.4 1.4.1 In what country is the store designed?
- 1.4.2 In what country is the store manufactured and by whom?
- 1.5 What other countries use the store?
Provide any environmental or safety data from overseas sources.
- 1.6 Which of the Services are likely to use the store?
- 1.7 Are prototype development drawings available? Y / N
1.7.1 Drawing Numbers and Titles _____
- 1.8 Are 'scaled' drawings available? Y / N
1.8.1 Drawing Numbers and Titles _____

1.9 Does the store have detachable components? Y / N

1.9.1 At what stage of the life cycle will they be assembled to constitute a complete store?

Note: If the individual components will at any stage be stored or deployed in different environmental conditions than the complete store annotate when this is the case throughout the remainder of the questionnaire.

1.10 Is there a practice or blank version of the store? Y / N

Note: If the practice or blank version will at any stage be stored or deployed in different environmental conditions than the operational version annotate when this is the case throughout the remainder of the questionnaire.

1.11 What is the next higher assembly of the item?

eg. in the case of a fuze, what projectile or weapon is it fitted to, in the case of rounds or missiles, what type of gun or launcher is used.

1.12 Are range safety templates available, or are they required?

1.13 If the store is for training purposes what is the required safe operating distance?

1.14 Which land based Service firing ranges, if any, will be used for:

1.14.1 the operational version of the store?

1.14.2 the practice version of the store?

1.15 Is there, or might there be, software used to control any safety critical function? Y / N

Packaging Information

Primary Packaging

Primary packaging is the smallest package unit, exclusive of integral casings, used to contain and transport the store or stores.

- 2.1 Is the store and/or components to be packaged at any time during its life cycle? Y / N
- 2.1.1 Describe the packaging. (Include UN package code)
- 2.1.2 Drawing Numbers? _____
- 2.2 Is the primary packaging used to contain:
- 2.2.1 the entire store? Y / N
- 2.2.2 individual sections or components of the store? Y / N
- 2.3 What is the orientation of the store within the packaging?

Secondary Packaging

Secondary packaging is any packaging unit holding more than one primary package and in which the primary packaged store spends a significant proportion of its life.

- 2.4 Is the store to be packaged in larger units ie. secondary packaging? Y / N
- 2.4.1 Describe the packaging.
- 2.4.2 Drawing numbers? _____
- 2.5 Describe the through-life storage configuration.

Service Life and Environment

- 3.1 What areas outside of Australia will the store be required to be in storage or operate in?

Note that the default environment for testing will be the ADF's likely operating environment, as described in higher Defence policy such as the Defence White Paper. AOC staff can provide advice on the extremes of this environment if necessary.

- 3.2 What is the duration for which the store is required to remain safe and suitable for service?

3.2.1 Service life (service life is a combination of storage life and operational life)? _____

3.2.2 Operational or training conditions (ie operational life) ? _____

3.2.3 If the store is an *aircraft installed* store, what is its required installed life? _____

- 3.3 Are stores or explosive components which become over-age to be:

3.3.1 expended in training? Y / N

3.3.2 demilitarised? Y / N

3.3.2.1 describe how:

3.3.3 disposed of? Y / N

3.3.3.1 describe how:

- 3.4 What are the store's 'render safe' requirements?

- 3.4.1 Does it have a capability for:
- 3.4.1.1 self destruction? Y / N
- 3.4.1.2 self neutralising? Y / N
- 3.5 For unused stores in a field or operational environment are they: (circle all choices that apply)
- a) destroyed, discarded, demilitarised etc; *(if different from 3.3 describe how)*
- b) returned to field store;
- c) repacked in secondary or primary packing (if unpacked) and returned to unit store;
- d) repacked in secondary or primary packing (if unpacked) and returned to depot via unit;
- e) repacked and returned direct to the depot;
- f) other: _____
- 3.6 How many times could the store be re-issued from the
- 3.6.1 depot store? _____
- 3.6.2 unit store for field deployment? _____
- 3.6.3 field store? _____

Logistics Transport

Road Transport

Road transport includes transport between the manufacturer , depot and unit but does not include transport in the field by vehicles such as armoured personnel carriers, tanks or amphibious craft.

4.1 Complete this table for each vehicle type used to transport the store by road.

Vehicle Type	Transport Phase	Sealed Roads		Unsealed Roads	
		Package State	Distance (km)	Package State	Distance (km)

Transport Phase: I = Manufacturer to Depot, II = Depot to Unit.

Package State: A = Primary, B = Secondary, C = Unpacked

Air Transport

Air transport includes transport between the manufacturer, depot and unit but does not include circumstances where the store is installed in an aircraft or carried internally or externally by an aircraft in an operational or training mission.

4.2 Complete this table for each aircraft type used to transport the store by air.

Aircraft Type	Transport Phase	Maximum Duration	Package State	Max. Altitude Unpressurised	Max. Altitude Pressurised

Transport Phase: I = Manufacturer to Depot, II = Depot to Unit.

Package State: A = Primary, B = Secondary, C = Unpacked

Sea Transport

Sea Transport includes transport between manufacturer, depot and unit but does not include circumstances where the item is stored on a combat, training or supply vessel, troop carrier or landing craft.

4.3 Complete this table for each ship type used to transport the store by sea.

If the store is transported as deck cargo state the additional protection provided, if any (eg ISO container).

Ship Type	Transport Phase	Maximum Duration	Package State	Stowed or Deck Cargo	Additional Protection

Transport Phase: I = Manufacturer to Depot, II = Depot to Unit.
Package State: A = Primary, B = Secondary, C = Unpacked

Rail Transport

4.4 Complete this table if the store is transported by rail.

Transport Phase	Distance, km (max)	Geographic Areas	Package State

Transport Phase: I = Manufacturer to Depot, II = Depot to Unit.

Package State: A = Primary, B = Secondary, C = Unpacked

Other Methods of Transportation

4.5 Will the store be transported by any other means?

4.5.1 Method?

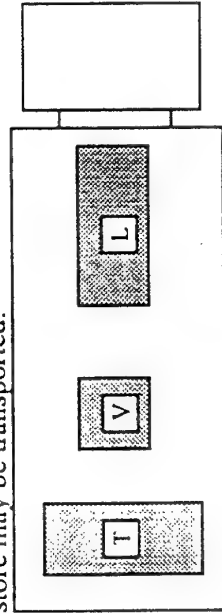
4.5.2 Distance?

4.5.3 Packaged state?

4.5.4 Geographic areas?

4.5.5 Transport phase?

4.6 On the plan view of a generic land sea or air vehicle below, tick all of the orientations in which the store may be transported:



Field Transport in Surface Vehicles

Field transport includes transport in the field by vehicles such as armoured personnel carriers, tanks or amphibious craft (amphibious craft should also be included in the storage at sea section), and includes use as installed equipment.

If the store could be transported in a mobile/towed launcher (eg field or air defence artillery) or on trolleys or other ground support equipment (eg transfer of bombs or missiles to aircraft), it should be included in this section.

5.1 Complete this table for all situations where the store is transported over land during field or operational use.

Vehicle Type	Wheeled/ Tracked	Distance (km)	Terrain / Surface	Package State	Stowage: Horizontal, Vertical, other.	Position: Front, Rear Sides. Internal/External	Purpose or Ad Hoc Racks: Give Details

Package State: A = Primary, B = Secondary, C = Unpacked

Aircraft Use and/or Carriage

This section covers circumstances where the store is installed in an aircraft, carried internally or externally by an aircraft in operational or training missions, including helicopter slung loads. This section does not cover air transportation to depots or unit stores.

6.1 Complete this table for all situations where the store experiences an airborne environment other than transport.

Aircraft Type	Total Flying Time (h) /Sorties	Internal or External	Positions in/on Aircraft	Mounting Method or Racks used	Subject to Arrested Landing: Y/N	Environmental Protection: In-Flight	Package State	Max dB Acoustic Noise

Package State: A = Primary, B = Secondary, C = Unpacked

6.2 Provide details of the known or maximum required vibration environment of the store at the aircraft position where it will be located.

6.3 Will the store experience free fall at or after launch? Y / N

- 6.4 What temperature extremes will the store experience during flight?
Include any known details of aerodynamic heating
 - 6.4.1 Maximum Temperature and duration?
 - 6.4.2 Minimum Temperature and duration?
- 6.5 Provide details of the operational and training flight profiles including duration, air speed and altitude. Include ferry flights.

[illegible]

Mission Type:							
Altitude							
Duration							

[illegible]

Mission Type:								
Altitude								
Duration								

Storage on Land

7.1 Complete this table for all types of storage conditions that the store will encounter on land.

Storage on land includes all types of storage facilities the store could encounter in depot, unit or field conditions. It includes storage at the manufacturer.

Air-conditioned facilities are those which have a controlled environment of temperature and humidity, whilst temperature controlled facilities are subject to normal humidity fluctuations.

A good quality storehouse is one in which the inside temperature would be expected to remain reasonably constant over a 24h period, but would follow seasonal changes. It would normally be constructed of solid brick or a similar material, and would have adequate ventilation.

A thin walled storehouse is one in which the inside temperature would be expected to follow, but not exceed, daily fluctuations. It would normally be of light construction, with adequate ventilation and give complete protection from sun and rain.

Storage Type	Temperature & Humidity	Depot, Unit or Field	Package State	Geographic Areas	Duration in Areas (Total)
Air Conditioned: Specify Temperature (°C) and Humidity (%)					
Temperature Controlled: Specify Temperature (°C)					
Good Quality Storehouse					
Thin Walled Storehouse					
Unventilated Temporary Storage: eg tents					
No Climatic Protection					

Package State: A = Primary, B = Secondary, C = Unpacked

Storage and Use on Ships

Storage on Ships includes circumstances where the item is stored on a training or supply vessel, troop carrier or landing craft or combat vessel. It also includes support craft, tenders, lighters, patrol boats and submarines but does not include transport between manufacturer, depot and unit.

8.1 Complete this table for all storage conditions that the store may encounter at sea.

Fitted storage facilities include, for example, ready-use lockers and loaded launchers.

If the store is stowed in more than one type of ship or magazine, provide the maximum and minimum temperatures that the store is likely to experience.

For position on ship, detail below or above the waterline, and forward, aft or midship.

	Air Conditioned Magazine	Forced Draft Ventilation	Fitted Storage Facility	Deck Cargo
Types of Ship				
Temperature (°C) & Humidity (%) (est)				
Package State				
Position on Ship				
Use of Purpose Designed Racks?: Describe Racks				
Duration in Ship Max at one time				

Package State: A = Primary, B = Secondary, C = Unpacked

8.2 Provide details of the known or maximum required vibration environment of the store as positioned in the vessel.

8.3 Could the store be subject to underwater shock? Y / N

8.3.1 Where is the most likely position of the store during the shock (eg magazine, ready use locker etc)? (*Include store orientation*)

8.3.2 Are the stowages on resilient mounts?

8.3.3 What is the most likely package state of the store during the shock?

Other Operational Environments

9.1 Will the store be subjected to high forces of acceleration (eg ground, sea or air-launched missiles or captive aircraft flight)? Y / N

9.1.1 Provide details of known or required forces.

9.2 Is the store required to operate under water or buried below ground (eg land and sea mines and torpedoes)? Y / N

9.2.1 What is the maximum operating or launch depth required?

9.2.2 What is the maximum duration required under water or below ground?

9.2.3 What geographic areas are involved?

9.3 Will the store be air-dropped?

9.3.1 From what height?

9.3.2 What is the package state of the store?

9.3.3 Describe any additional protection used.

9.4 If the store will be lifted at any time during transport and handling (eg by a crane, into a ship from a lighter, onto or off a jackstay, or onto an aircraft manually or using a machine (eg MJ1), list for each case:

Lifting Device or Method	Packaged State	Additional Protection Provided	Maximum Height Lifted (m)	Action to be taken with Dropped Stores

Package State: A = Primary, B = Secondary, C = Unpacked

9.5 Will the store experience vibration or shock as a result of firing a gun (aircraft, ship or artillery)?

9.5.1 What type of gun?

9.6 Will the store experience temperature shock due to sudden changes in the environment (eg submarine launched weapon, air launched weapon) ? Y / N

9.6.1 Provide details of the temperature change and duration of the change.

Environment Exposure

10.1 Provide details of exposed environments that the store may experience. Include details of any protection provided.

	Solar Radiation	Dust/ Sand/Mud	Salt Spray	Rain	Fuel /Oil (Specify Type)	Other Contaminants (Specify)	Immersion in Water
Duration of Exposure							
Package State							
Geographic Areas							
Protection Provided							
Life Cycle Phase							

Life Cycle Phase: I = Transport, II = Storage, III = Operational Use
 Package State: A = Primary, B = Secondary, C = Unpacked

10.2 Is the store required to survive prolonged exposure to high temperatures such as a round of ammunition held in a hot gun chamber or a fire extinguisher cartridge close to power plants in aircraft? Y / N

10.2.1 situation?

10.2.2 maximum temperature?

10.2.3 maximum duration?

Abnormal Hazards and Events

11.1 Is the store required to be an Insensitive Munition (IM) IAW DI(G) LOG 07-10.

11.2 Complete this table for all occasions where the store could be exposed to fire:

The configuration describes the state of the store ie all up round, components etc.

	Liquid Fuel Fire	Other Fire Directly on Store or Packaging	Fire in an Adjacent Compartment
Configuration of Store			
Package State			
Materials in Fire ie. Fuel			
Response Required to be Known? Y / N			
Known Fire Hazards of Store (eg smoke, fumes)			
Firefighting / Emergency Time Available			

Package State: A = Primary, B = Secondary, C = Unpacked

11.3 Is the store required to survive the following effects of a nuclear environment:

11.3.1 Gamma Rays or X - Rays? Y / N

11.3.2 Electromagnetic Pulse (EMP)? Y / N

11.4 Complete the following table if the store could encounter any of the following impacts or shocks during its life cycle.

*The anticipated hazard is the weapon or event which would cause the effect.
The configuration describes the state of the store ie all up round, components etc. Note whether the store is protected by other structures (such as a ship's hull or turret of an AFV).*

	Bullet Impact	Fragment Impact	Shaped Charge Jet	Detonation of an Adjacent Store
Anticipated Hazard				
Store Configuration				
Package State				

Package State: A = Primary, B = Secondary, C = Unpacked

11.5 Complete the following table if the store could encounter an electromagnetic environment at any time during its life cycle:

	Electrostatic Charge	Lighting	Service Electromagnetic Environment	Induction of Transient Energy
Anticipated Hazard				
Store Configuration				
Packaged State				

Package State: A = Primary, B = Secondary, C = Unpacked

Note whether there is any protection from the electromagnetic environment during handling (such as loading) or when loaded (in launchers or on aircraft).

11.5.1 Does the store contain an Electrically Initiated Explosive Device? Y/N

AUSTRALIAN ORDNANCE COUNCIL DOCUMENT DATA SHEET

				1. Page Classification	
				UNCLASSIFIED	
				2. Privacy Marking/ Caveat (of document)	
3a. AR Number AR-009-144	3b. Report Number 265.96 ASP1001.96	3c. Type of Report PILLAR	4. Task Number 270		
5. Security Classification U U U S (Secret) C (Conf) R (Rest) U (Unclass) Document Title Abstract For UNCLASSIFIED documents with a secondary distribution LIMITATION, use (L) in document box.					
6. Document Date 24 July 1996		7. Number of Pages		32	8. Number of Refs. 1
9. Title PILLAR REPORT - ENVIRONMENTAL QUESTIONNAIRE FOR ARMAMENT STORES					
10. Author(s) SQNLDR GREG WILCOCK			11. Downgrading/Delimiting Instructions		
12a. Corporate Author and Address Australian Ordnance Council, Department of Defence, CP2-3-21, Campbell Park Offices, Canberra, ACT, 2600 AUSTRALIA			13. Officer/Position responsible for Security: _____ PAOC Downgrading: _____ PAOC Approval for release: _____ PAOC		
12b. Task Sponsor PRESIDENT AUSTRALIAN ORDNANCE COUNCIL					
14. Secondary Release Statement of this Document Public Access					
15a. Deliberate Announcement No Limitation					
15b. Casual Announcement (for citation in other documents) <div style="text-align: center;">✓</div> <div style="display: flex; justify-content: space-between;"> No Limitation Ref. by Author, Doc No. and date only </div>					
16. Keywords PILLAR REPORT, ENVIRONMENTAL, QUESTIONNAIRE, ARMAMENT STORES					
18. Abstract 1. This report publishes a revised AOC Environmental Questionnaire. 2. AOC Proceeding 194.91 is cancelled					